

# REVIEW

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### A NEW SPECIES OF WHIPTAILED LIZARD (GENUS *Cnemidophorus*) FROM THE COLORADO PLATEAU OF ARIZONA, NEW MEXICO, COLORADO, AND UTAH

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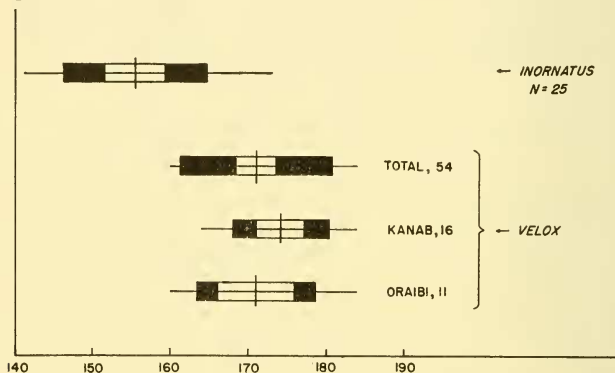
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In a previous paper it has been shown that the holotype of the form of *Cnemidophorus* described by Burger (1950) as *C. sacki stictogrammus* represents a distinct species and is not a member of the sympatric species *C. sacki* to which it was assigned. In the present paper *C. sacki innotatus* also described by Burger (*op. cit.*) in the same study is similarly shown to be a different species from *C. sacki*; it is *Cnemidophorus velox* described by Springer (1928) as *C. gularis velox*. Both of these forms described by Burger (*stictogrammus*, and *innotatus* = *velox*) are sympatric with *C. sacki* in Arizona.

Neither Burt (1931) nor Burger (1950) properly assigned Springer's (1928) material. Springer (*op. cit.*) designated no specimen as type and his four original specimens were cotypes. Burger (*op. cit.*) accepted M.C.Z. No. 37208 as lectotype of *velox* by Burt's (1931:124, 127) designation; this specimen is also accepted here as the type specimen. However, Burger continued the error of the identity of this specimen with the statement (1950:3) that "It is an example of *C. inornatus*," and proceeded to redescribe *velox* as *C. sacki innotatus*. M.C.Z. No. 37208 is not an example of *C. inornatus* (= *perplexus* auct.) as is shown by analysis of characters of scalation; it is an example of *C. velox* Springer. Burger (1950:4), in redescribing *C. velox* as *C. sacki innotatus*, states that "Springer (1928) may have had specimens of this lizard [*innotatus*] on hand when he described *velox*; in

some respects his description fits it better than *inornatus*." This is quite true.

During the past few years I have collected topotypes of *C. velox* from Oraibi, Arizona, and Pueblo Bonito (in Chaco Canyon National Monument), New Mexico; both of these localities were spoken of by Springer (1928) as localities from whence came his type series of four specimens of *C. gularis velox* (Oraibi, 3; Pueblo Bonito, 1). The topotypic material of *C. velox* is species-identical with a series of topotypes of *C. sacki innotatus*



#### DORSAL SCALES (OCCIPUT TO RUMP)

Comparison of *C. inornatus* Baird and Girard and *C. velox* Springer. The white rectangles enclose two standard errors of the mean. One white plus black rectangle encloses one standard deviation. The differences between the two species are highly significant. The differences between the two populations of *C. velox* are not significant. Data from Tables 1 and 2.

Burger that have also been collected for this study in the vicinity of Kanab, Utah, the type locality. Moreover, this species (*C. velox*) has been collected together with *C. sacki* at several localities in Arizona, as further discussed below.

In Table 1 are presented results of statistical analysis of characters of scalation of *C. sacki*, *C. inornatus*, and *C. velox*. Table 2 presents a comparison of *C. inornatus* with samples of *C. velox* from the two type localities involved: (a) the type locality of

Springer's (1928) *C. gularis velox* (Oraibi, Navajo County, Arizona), and (b) the type locality of Burger's (1950) *C. sacki innotatus* (vicinity of Kanab, Kane County, Utah). Both of these type localities are in Pinyon-Juniper Woodland. Only one other species of lizard in the genus *Cnemidophorus* is known to occur in the vicinity of Oraibi or Kanab; this is *C. tigris* which is represented by the northern subspecies *C. tigris septentrionalis* Burger which is a valid and especially distinctive race. From analysis of scalation and of color pattern it is clearly evident that *C. gularis velox* Springer (1928) = *C. sacki innotatus* Burger (1950).

The question now arises as to whether *velox* is or is not conspecific with *sacki* (= *gularis*) as now understood. This question has been unequivocally answered by having found *velox* and *sacki* to be sympatric over a wide area where the ranges of the two overlap in Arizona. At such localities each maintains its own respective genetic differences without evidence of gene exchange. One is able to shoot adults of both species (*velox* and *sacki*) while standing in the same spot at localities where they are sympatric (e.g., Pinal Mountain, Gila County; Prescott Mountains, Yavapai County; Oak Creek, Coconino County). See Table 1 for certain similarities and differences in morphological characters of these two species.

*Cnemidophorus velox* is a whiptail of Woodland and Coniferous Forest habitats. It is the common striped whiptail of the so-called Colorado Plateau of northern Arizona and New Mexico, southern Utah and Colorado. It exceeds in both altitude and north latitude the ecologic distribution of *C. sacki* in Arizona and New Mexico. *C. sacki* does occur (marginally) in Coniferous Forest and occurs in Pinyon-Juniper Woodland. Thus on outlying mountain masses south of the main body of the Colorado Plateau, the two species are found to be sympatric in Woodland and Coniferous Forest habitats in central Arizona, near the northern limit of the geographic distribution of *C. sacki* and the southern limit of *C. velox*.

The much larger *C. velox* is also specifically distinct from the small *C. inornatus* (= *perplexus* auct.). These two species resemble one another superficially in color and pattern, particularly in the total absence of light spots on the body of both juvenile and adult; small individuals of the two species have been most

commonly confused. The highly significant difference in the dorsal scalation of these two species is shown in Table 2 and Figure 1. The *species* rather than *subspecies* relationship of the two is also clearly evinced by the fact that the much larger bodied form (*C. velox*) is the one with the northward distribution (on the Colorado Plateau) while the smaller sized form (*C. inornatus*) is a predominantly Mexican population ranging only into the southern United States. This relationship of surface-volume ratio to environmental temperature is opposite to that which is to be predicted on the basis of the Bergmann Principle applied to ectotherms (see Fitch, 1940:123; Cowles, 1945). Also *C. inornatus* is a species primarily of grasslands and plains and does not reach the higher elevations attained by *C. velox* in Coniferous Forest habitats (7000-8000 ft.) in the United States.

The following diagnosis of *C. velox* Springer (1928:102) is based upon the type specimen, topotypes recently collected, and additional series recently collected in Colorado, Utah, Arizona, and New Mexico.

CNEMIDOPHORUS VELOX Springer  
Plateau Whiptail

*Type specimen.* No. 37208, Museum of Comparative Zoology. Collected in August, 1928 by Stewart H. Springer. The type locality is here restricted to Oraibi, Navajo County, Arizona. See discussion below.

*Diagnosis.* A moderately-sized species of *Cnemidophorus* characterized by: (1) a maximum snout-vent length of approximately 85 mm.; (2) 6 or 7 longitudinal light body stripes, with the seventh (vertebral) stripe, when occurring, less distinct than the remaining stripes; (3) total absence of light spots in the dark fields on the body; (4) ground color of the upper surfaces of the body black to blackish-brown; (5) ventrum immaculate whitish very faintly tinged with bluish; (6) distal portion of tail light bluish in adults and bright blue in juveniles; (7)  $171.1 \pm 1.3$  (160-184) scales on the midline from occiput to rump; (8)  $73.1 \pm 0.63$  (63-85) scales around midbody, excepting the enlarged ventrals; (9)  $7.7 \pm 0.16$  (5-10) scales between paravertebral stripes at midbody; (10) mesopterygial scales conspicuously enlarged and abruptly differentiated from the adjacent granu-

lar scales of the gular fold; (11) postantebrachial scales *not* greatly enlarged (not enlarged as in *C. sacki*) to 4 or more times the size of adjacent scales.

*Distribution.* On the so-called Colorado Plateau of northern Arizona and New Mexico, southern Utah and southwestern Colorado. The range extends southward on outlying mountain ranges to at least central Arizona and to central or southern New Mexico. The relationships to *C. velox* of a group of apparently non-spotted, small, mountain-dwelling populations of northern Mexico is currently being investigated.

*Comparisons.* *C. velox* is distinguished from *C. sacki*, with which it is sympatric, by characters of color pattern and body size as well as scalation (see Table 1). *C. velox* is smaller, non-spotted, has a black to blackish-brown ground color, and a light bluish tail (adults) that is bright blue in juveniles; *C. sacki* is larger, spotted, has a light brown to dark brown ground color, and a brownish tail.

*C. velox*, while superficially resembling *C. inornatus* in color pattern, is clearly distinguished from *inornatus* in body size and scalation (see Tables 1 and 2). *C. velox* is considerably longer, larger, and with a greater number of dorsal scales.

*Discussion.* Smith and Taylor (1950:184) give the type specimen of *C. gularis velox* Springer as Butler University No. 848, thereby following Burt (1931:124, 127) while at the same time accepting and using Burger's (1950:3) nomenclature (*C. inornatus* with *C. gularis velox* a synonym) based on the type specimen in question as Harvard M.C.Z. No. 37208. The problem is not so simple as stating or assuming that Butler Univ. No. 848 is now M.C.Z. No. 37208.

Mr. Arthur Loveridge of the Museum of Comparative Zoology has kindly checked details of the record concerning M.C.Z. No. 37208. He has recently informed me that the M.C.Z. has had no recorded dealings with Butler University, that the museum register records this specimen as having been received from one J. Piatt on January 11, 1934, and that it is the holotype of *Cnemidophorus gularis velox* Springer, collected at Lee's Ferry, Arizona, August, 1928, by Stewart H. Springer. The data on the specimen label gives the same information, including "Gift from J. Piatt, Indianapolis[sic]." The specimen in question (No. 37208) is recorded as the holotype of *Cnemidophorus gularis*

*velox* Springer in the second list of type material in the M.C.Z. (Barbour and Loveridge, 1946:92); this action, with type locality given as Lee's Ferry, Arizona, antedates the action of Smith and Taylor (1950) who restrict the type locality to Pueblo Bonito, New Mexico. While it is possible that M.C.Z. No. 37208 could be Butler Univ. No. 848, there is nothing in the record to so indicate. As far as can be now determined, there is no record at Butler University for the final disposition of this specimen or any of the others in the type series of *C. gularis velox* Springer. Dr. N. E. Pearson, Head of the Department of Zoology of Butler University, informed me on December 1, 1954, that he was unable to find either a record or specimen used by Springer in describing *Cnemidophorus gularis velox*.

In a paper entitled "An annotated list of the lizards of Lee's Ferry, Arizona," Springer (1928) described *Cnemidophorus gularis velox* and recorded the collection of his four specimens (cotypes) as follows: Oraibi, Arizona, 3; Pueblo Bonito, New Mexico, 1. My study of M.C.Z. No. 37208 shows it to be a specimen of *C. velox* described by Springer, and not a specimen of *C. inornatus* (= *perplexus* auct.) as is stated by Burger (1950:3).

I consider the holotype of *C. velox* (= *C. gularis velox*) Springer to be M.C.Z. No. 37208, the type locality of which is here changed to Oraibi, Navajo County, Arizona, rather than Lee's Ferry, Coconino County, Arizona (*vide* Springer, 1928). Ample topotypes are now available from Oraibi and vicinity. Burger (1950) concurs in the citation of M.C.Z. No. 37208 as the type of *C. g. velox* Springer. The later action by Smith and Taylor (1950:184) in their restriction of the type locality to Pueblo Bonito, San Juan County, New Mexico, is not acceptable. Dr. Hobart Smith has recently concurred in this opinion (*in litt.*).

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